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ABSTRACT

As the most effective, long-range means of diffusing environmental education throughout the general curriculum, students preparing to become teachers are focused upon in this publication. Since such preparation will require changes, additions, and adjustments in the teacher education programs of colleges and universities, this guide offers practical suggestions as to approaches and methods that may be employed as environmental education is introduced into preservice teacher preparation. The proposed guidelines, designed to bring about effective coordination of programs at all levels, are organized around three central questions: who should be prepared as teachers of environmental education?, what competencies should environmental education teachers possess?, and what means can be used to prepare teachers with competence in environmental education? For the second question, Roth's 111 concepts for environmental management education (K-16) are listed under desired subject matter competencies, accompanied by an enumeration of professional competencies. Observations about teacher education and recommendations for teacher education institutions are noted for the third question. An epilogue contains ideas which do not fit readily into the three main sections but which suggest points to be remembered while formulating guidelines for preservice programs. References and resource lists are appended. (BL)

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# ENVIRONMENTAL EDUCATION
# Preservice Preparation of Teachers

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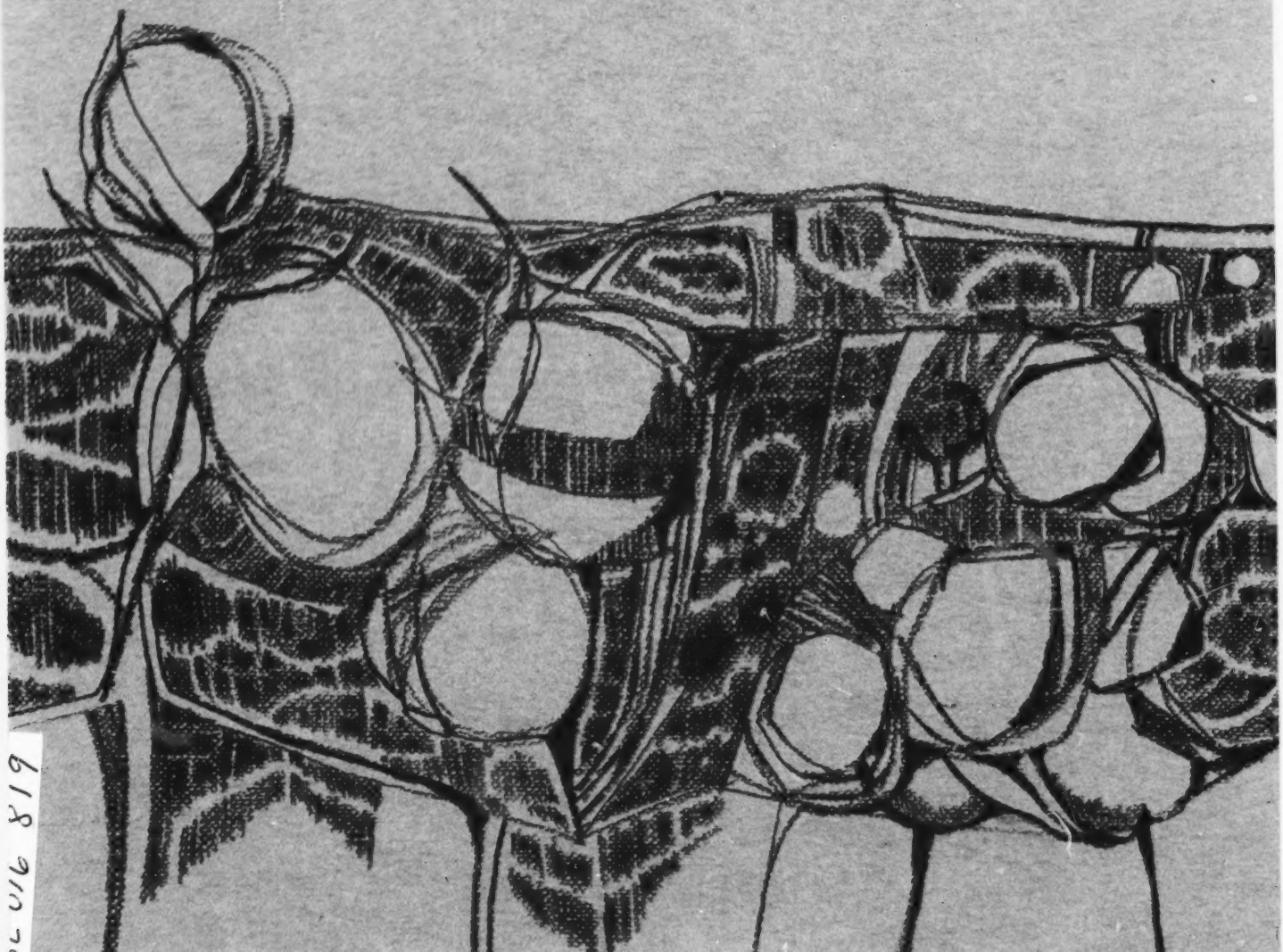

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# ENVIRONMENTAL EDUCATION

## Preservice Preparation of Teachers

Division of Science Education
State Department of Public Instruction
Raleigh, N. C.
June 1973

# FOREWORD

In response to public concern and the mandate of the 1969 General Assembly, North Carolina's Department of Public Instruction and the public school system are engaged in planning and initiating a long-range program of environmental education.

Preliminary studies have indicated that preservice education of teachers in several subject areas, and at all levels, should be a primary effort. An interdisciplinary approach is called for, and it is not probable that a large number of specialists in environmental education can be trained and employed in the next few years. In-service education of teachers will be helpful, but if the endeavor to diffuse environmental education throughout the general curriculum is to be most effective, students preparing to become teachers should become familiar with important concepts of environmental education.

Such preparation obviously will require some changes, additions, and adjustments in the teacher education programs of our colleges and universities. It will take close cooperation between state and local education agencies and teacher education institutions to assure effective articulation of their respective parts in the total effort.

This publication offers practical suggestions as to approaches and methods that may be employed as environmental education is introduced into preservice teacher preparation. Since emphasis on environmental concerns is a new and rapidly developing area of interest, there will no doubt be experimentation with various approaches. Suggestions contained in this publication should be helpful in establishing guidelines that will bring about effective coordination of programs at all levels.

A preliminary version of this publication was distributed to all the teacher training institutions in North Carolina for critical review and reactions. More than half of the institutions responded, expressing general acceptance of the major ideas. We urge institutions and individuals to share with us their reactions to this publication and their suggestions for a positive and aggressive environmental education program for North Carolina.

A. Craig Phillips
State Superintendent of Public Instruction

June 1973

## PREFACE

In proposing a program for the preservice preparation of teachers in environmental education, three central questions emerge: (1) Who should be prepared as teachers of environmental education? (2) What competencies should environmental education teachers possess? (3) What means can be used to prepare teachers with competence in environmental education?

This publication on the preservice preparation of teachers in environmental education is organized around the above three questions. An epilogue contains some ideas which do not appear to fit readily into the three main sections, but which suggest points to be kept in mind while formulating guidelines for preservice programs. Finally, Appendices A, B, and C contain references and lists of other resources in environmental education.

Appreciation is extended to Dr. Norman D. Anderson, Professor of Science Education, North Carolina State University, for extensive assistance in the preparation of this publication.

Jerome H. Melton
Assistant State Superintendent
for Program Services

CONTENTS

FOREWORD. . . . . i

PREFACE . . . . . ii

WHO SHOULD BE PREPARED AS TEACHERS OF ENVIRONMENTAL EDUCATION?. . . . . 1

WHAT COMPETENCIES SHOULD ENVIRONMENTAL EDUCATION TEACHERS POSSESS?. . . . . 2

Subject Matter Competencies. . . . . 3

*CONCEPTS FOR ENVIRONMENTAL MANAGEMENT EDUCATION (K-16)*. . . . . 3

Professional Competencies. . . . . 10

WHAT MEANS CAN BE USED TO PREPARE TEACHERS WITH COMPETENCE IN ENVIRONMENTAL EDUCATION? . . . . . 12

Observations About Teacher Education . . . . . 12

Recommendations For Teacher Education Institutions . . . . . 13

EPILOGUE. . . . . 16

APPENDIX A. . . . . 17

*REFERENCES* . . . . . 17

APPENDIX B. . . . . 18

*MATERIAL ON ENVIRONMENTAL EDUCATION PREPARED BY THE NORTH CAROLINA STATE DEPARTMENT OF PUBLIC INSTRUCTION* . . . . . 18

APPENDIX C. . . . . 21

*BIBLIOGRAPHY OF BIBLIOGRAPHIES* . . . . . 21

## WHO SHOULD BE PREPARED AS TEACHERS OF ENVIRONMENTAL EDUCATION?

Teacher education programs must always take into consideration what is happening in our schools and also allow for the trends that are occurring. When planning such programs, answers should be sought to such questions as:

1. Is environmental education being taught by regular classroom teachers or by specialists?
2. Are there trends which suggest what the practice may be five or ten years from now?
3. Will environmental education be taught as a separate subject or integrated into the present courses in the curriculum?

These questions were considered by the Task Force on Environment and Natural Resources (Reference #2). Some information is revealed on what is happening in North Carolina in the report on the status of environmental education in North Carolina (Reference #8). On the basis of these documents, the judgments of competent professionals, and the history of the way new movements are handled by the public schools, the following assumptions are made:

*Assumption 1.* Although a few schools have experimented, and others will experiment, with separate courses in ecology and other areas that can be classified as environmental education, the major part of the effort in the foreseeable future will be through the integration of the concepts of environmental education into the present subjects of the curriculum. There are several reasons that support this assumption. The curriculum and the school day are already crowded and there is usually resistance to dropping courses and activities. Without the availability of qualified teachers and student materials, the adoption of new courses is usually limited.

*Assumption 2.* Most of the teaching will be by regular classroom teachers and few school units will employ environmental education specialists. Few North Carolina school units employ specialized supervisors, resource teachers, or consultants in the regular school subjects such as English, mathematics, science, and social studies. With a tight money situation, it does not appear reasonable to expect school units to employ environmental education specialists unless federal or state funds become available specifically for that purpose. Furthermore, it is assumed that the

small number of specialists that may be employed will probably come mainly from the ranks of experienced science and social studies teachers.

*Assumption 3.* The key people are prospective elementary school teachers and those specializing in science and social studies at the secondary level. Although every teacher should be a teacher of English, environmental education, good character, etc., it is felt that the majority of the burden will be carried by elementary school teachers and teachers of science and social studies. A large percentage of the concepts of environmental education are most closely related to disciplines of science and social studies.

Elementary school teachers, of course, teach science and social studies and this makes them an important part of an environmental program. But elementary school teachers are also important in an environmental education program for other reasons. The curriculum of the elementary school is generally more flexible than that of the more advanced grades. This flexibility allows for greater inclusion of topics generated by student interest and it is expected that topics in environmental education will be among those of high interest. In addition, many of the ideas of environmental education are attitudinal and thus elementary school teachers are critically important (based on the premise that attitudes are most easily developed and/or changed when children are young).

The fact that science and social studies are required subjects at the secondary level is an important reason why teachers of these subjects are in a position to make a major contribution. Industrial arts, although reaching fewer students, also can make a contribution since its major goal is the interpretation of technology and its impact on our society.

## WHAT COMPETENCIES SHOULD ENVIRONMENTAL EDUCATION TEACHERS POSSESS?

"What competencies should teachers possess?" is always a difficult question to answer and it is especially difficult in a new and developing area such as environmental education. Some would answer that what is needed are "well educated" teachers who will learn these things through reading, viewing television, and engaging in discussions. Others would respond that what is needed is a person who is receptive to the ideas of environmental education and one who has an "acceptable" philosophy.

Although there is merit in these answers, it is felt that a more specific statement would be the most useful in planning curriculum and related activities. Of all the attempts to define environmental education, it is judged that the work by Roth is the most promising (Reference #5). Roth has identified a list of 111 important concepts in environmental education. The procedures used by Roth in synthesizing and validating his list of concepts contribute to its value and potentially wide acceptance. The list of concepts appear to be in substantial agreement with definitions and lists recently developed by others (References #1, 4, 6).

It should be obvious that a job analysis approach to defining teacher competencies in environmental education would be of little value. Teachers are not yet doing many of the things that are being called for. The alternative, then, is to design a program that will prepare teachers to do that which is judged to be needed. Roth's list of concepts appears to be a good starting point.

Subject Matter Competencies

The 111 concepts identified by Roth are intended to delineate what our citizens should know about environmental education. It follows that if teachers are to help students acquire these concepts, they must also possess an understanding of these concepts. Therefore, it is recommended that prospective teachers of environmental education acquire, by the time of their certification, an understanding of the following:

*CONCEPTS FOR ENVIRONMENTAL MANAGEMENT EDUCATION (K-16)**

1. Living things are interdependent with one another and their environment.

Environmental Management

2. Man has been a factor affecting plant and animal succession and environmental processes.
3. The management of natural resources to meet the needs of successive generations demands long-range planning.
4. Environmental management involves the application of knowledge from many different disciplines.
5. Modern man affects the structure of his environment.

*Roth, Robert E. "Fundamental Concepts for Environmental Management Education (K-16)," Environmental Education, Volume 1, Number 3, (Spring 1970), pp. 69-73.

6. Esthetic resources and recreational facilities of economic and noneconomic value are becoming increasingly important in leisure-time activities.

7. Man has ability to manipulate and change the environment.

8. A knowledge of the social, physical, and biological sciences and humanities is important for environmental understanding.

9. Social and technological changes alter the interrelationships, importance, and uses for natural resources.

10. There are certain risks taken, and limitations experienced, when manipulating the natural environment.

11. Resource depletion can be slowed by the development and adoption of alternatives.

12. Environmental management has effects on individuals and social institutions.

13. Man's need for food, fiber, and minerals increases as populations expand and levels of consumption rise.

14. Conflicts emerge between private land use rights and the maintenance of environmental quality for the general public.

15. A cultural and time lag exists between the development of knowledge in science and technology and application of that knowledge to resource and environmental problems.

16. Management is the result of technical and scientific knowledge being applied in a rational direction to achieve a particular objective.

17. The management of natural resources is culture-bound.

## Management Techniques

18. Increased population mobility is changing the nature of the demands upon some resources.

19. Options available to future generations must not be foreclosed.

20. A variety of institutional structures is involved in planning and managing the environment.

21. Hunting regulations are useful in maintaining and restoring populations as well as in distributing the game harvest.

22. Multiple use is a practice in which a given land area functions in two or more compatible ways.

23. Management of habitat is considered to be an effective technique of wildlife management when the desire is to increase numbers of particular populations.

24. Architecture can be one of the positively persuasive influences in developing a congenial environment.

25. Zoning is a practice in which land uses are prescribed, based upon value judgments regarding the needs of society.

## Economics

26. Ready transportation, growing interest, money surpluses, and increased leisure time combine to create heavy pressures on existing recreation facilities and demands for new ones.

27. Outdoor recreation is an increasingly important part of our culture and our economy.

28. The economy of a region depends on the utilization of its natural, human, and cultural resources and technologies over time.

29. Economic efficiency does not always result in conservation of a natural resource.

30. The distribution or location of resources in relation to population, technological, and economic factors is critical to problems of resource conservation and use.

31. The political and economic strength of a country is, in part, dependent upon its access to domestic and foreign resources and international relationships.

32. Conservation policy is determined by the interaction of science and technology; social and political factors; and esthetic, ethical, and economic considerations.

33. Conventional benefit-cost analyses do not always result in sound conservation decisions.

34. A sound natural resource policy is dependent upon a flexible political system, pragmatically appraising and reappraising policies and programs in terms of their effect upon the public interest and in light of scientific knowledge about the natural resources.

35. Consumption practices are constantly being expanded by our ability to produce and create wants and markets, which affect the rate of resource use.

36. Individuals tend to select short-term economic gains, often at the expense of greater long-term environmental benefits.

37. Increasing population and per capita use of resources have brought changed land to man or resource to population ratios.

38. Goods and services are produced by the interaction of labor, capital, natural resources, and technology.

39. Long-range planning for the use and allocation of natural and human resources is continually evolving.

40. Choices between needs (essentials) and wants or desires (nonessentials) are often in conflict.

41. Raw materials and energy supplies are generally obtained from those resources and places where they are available at least cost, usually in short economic terms.

42. Supply and demand, in relation to values held by society, determine what is a resource and its economic values.

43. The more efficient use of some resources is the result of technical and marketing improvements.

## Environmental Problems

44. Safe waste disposal, including the reduction of harmful and cumulative effects of various solids, liquids, gases, radioactive wastes, and heat is important if the well-being of man and the environment is to be preserved.

45. Pollutants and contaminants are produced by natural and man-made processes.

46. Increasing human populations, rising levels of living, and the resultant demands for greater industrial and agricultural productivity promotes increasing environmental contamination.

## Environmental Ecology

47. Natural resources are interdependent and the use or misuse of one will affect others.

48. In any environment, one component like: space, water, air, or food may become a limiting factor.

49. Most resources are vulnerable to depletion in quantity, quality, or both.

50. The interaction of environmental and biological factors determines the size and range of species and populations.

51. Natural resources, water and minerals in particular, are unequally distributed with respect to land areas and political boundaries.

52. The renewable resource base can be extended by reproduction, growth, and management.

53. Natural resources affect and are affected by the material welfare of a culture and directly or indirectly by philosophy, religion, government, and the arts.

54. The natural environment is irreplaceable.

## Adaptation and Evolution

55. An organism is the product of its heredity and environment.

56. Man is influenced by many of the same hereditary and environmental factors that affect other organisms and their populations.

57. The rate of change in an environment may exceed the rate of organism adaptation.

58. Organisms and environments are in constant change.

59. All living things, including man, are continually evolving.

60. The form of life present depends upon the coincidence of the life needs and their availability in an environment.

61. Biological systems are described as dynamic because the materials and energy involved are parts of continuous cycles; inorganic materials and energy become part of organic materials and are subsequently broken down into simpler substances and energy as a result of the operation of organic systems.

62. Animal populations are renewable resources.

63. Succession is the gradual and continuous replacement of one kind of plant or animal complex by another and is characterized by gradual changes in species composition.

## Natural Resources

64. Water supplies, both in quantity and quality, are important to all levels of living.

65. The earth and life on it are greatly affected by the atmosphere.

66. Water is a reusable and transient resource, but the available quantity may be reduced or quality impaired.

67. As populations increase, competition for the use of water increases, resulting in a need for establishing water-use priorities.

68. The amount of precipitation that becomes available for use by man varies with topography, land use, and applied management practices.

### *Minerals*

69. Mineral conservation involves the utilization of all known methods of using the minerals of the earth's crust that will cause them to serve more people for a longer time.

70. The nonrenewable resource base is considered finite.

71. Soil is classified as a renewable resource, but, because it may take a few years to thousands of years to be "renewed," it is more practically termed a depletable resource.

72. Minerals are nonrenewable resources.

### *Soil*

73. Maintaining, improving, and in some cases restoring soil productivity, is important to the welfare of people.

74. Geological processes like erosion and deposition modify the landscape.

75. Soil productivity can be maintained by utilizing known agronomical, mechanical, and chemical processes.

### *Plants*

76. Green plants are the ultimate sources of food, clothing, shelter, and energy in most societies.

77. Plants are renewable resources.

78. Energy is supplied to an ecosystem by the activities of green plants.

### *Animals*

79. Wildlife refuges, undisturbed natural areas, and preserves may be of value in protecting endangered species and perpetuating the gene pool.

80. Wildlife populations are important economically, esthetically, and biologically.

81. Wildlife is considered to be a public resource.

## The Socio-Cultural Environment

82. Man has responsibility to develop an appreciation of and respect for the rights of others.

83. Individual citizens should be stimulated to become well informed about resource issues, problems, management procedures, and ecological principles.

84. Conservation responsibilities should be shared by individuals, businesses and industries, special interest groups, and all levels of government and education.

85. Man has moral responsibility for his environmental decisions.

86. Knowledge of the social structures, institutions, and culture of a society must be brought to bear on environmental considerations.

87. The relationships between man and the natural environment are mediated by his culture.

88. Man is developing the technical and sociological knowledge needed to control population growth, modify environments, and alter resource use patterns.

89. Social values and mores influence personal conservation behavior.

90. Public opinion constitutes a control over the use of conservation practices.

91. In a democracy, a basic theory is that increasing restrictions on resource allocation and use are imposed by the consent or insistence of the people.

## Culture

92. The culture of a group is its learned behavior in the form of customs, habits, attitudes, institutions, and lifeways that are transmitted to its progeny.

93. Man has psychobiological and biosocial needs.

94. Human resources include the physical and mental abilities with which man is endowed and the knowledge he has generated.

95. Historically, cultures with high technological development have used more natural resources than those with lower levels of technological development.

## Politics

96. Individual citizens should be stimulated to become active in the political process.

97. We have "legal" ownership of some resources like real estate and control over others during our lifetime, but ethically, we are "stewards" rather than owners of the resource base.

98. Policies, including natural resource policies, came about as the result of interacting social processes: science and technology, government operations, private interests, and public attitudes.

99. Conservation policies are often the result of group action.

100. As populations increase and/or resource supplies decrease, the freedom of the individual to use the resources as he wishes decreases irrespective of the form of government.

## The Family

101. Family planning and the limiting of family size are important if overpopulation is to be avoided and a reasonable standard of living assured for successive generations.

102. The individual must develop his ability to perceive if he is to increase his awareness and develop environmental perspective.

103. Individuals perceive different self-roles depending upon their position in the social and environmental context.

104. Man has the capability of improving society through sociology, psychology, and science.

105. Man is a high animal form because of his ability to reason.

106. Man is continually developing an ethical base for making value judgments.

107. Man performs some tasks at a high physiological cost.

## Psychological Aspects

108. Opportunities to experience and enjoy nature are psychologically rewarding to many and are important to mental health.

109. The need of man to turn inward for self-renewal can be stimulated by his external esthetic experiences.

110. Resources have a psychological impact on people.

111. Emotional reactions can be elicited by exposure to physical objects and geometric forms.

## Professional Competencies

To know something, or to be a certain kind of person, does not necessarily mean that one can teach another that knowledge or mode of behavior. In trying to describe the professional competencies needed by a teacher, several problems are encountered. First, there is no clear-cut distinction between content and methodology. Some of the concepts in the preceding list are examples of attitudes and values that might also be considered an integral part of professional competence. Second, teaching styles vary and thus the emphasis varies on particular skills making up professional competence. For example, a highly structured teacher needs more expertise in performing certain tasks than does one who operates with less

structure and vice versa. Third, there are wide differences of opinion as to what constitutes good teaching.

In spite of these and other problems, there appears to be merit in trying to identify at least the minimum professional competencies desired. As a starting point, let us consider statements like Guideline XI of the AAAS Report on Teacher Preparation (Reference #3).

> Teacher education programs should develop the ability of the future teacher to select, adapt, evaluate, and use strategies and materials for the teaching of science or mathematics so that the teaching-learning situation for which he is responsible will be consistent with general knowledge about teaching and learning, and will be appropriate both to the special needs of the learners and to the special characteristics of the science disciplines or the interdisciplinary problems. (p. 36)

More specifically, the following are examples of tasks that teachers of environmental education should be able to perform:

1. Write at least one behavioral objective that is related to each of the 111 concepts listed in the preceding section, which is appropriate for the grade level at which the prospective teacher plans to teach, or be able to give an example of each of the concepts.
2. Devise at least two instructional strategies to achieve each of these objectives and possess the skill to carry out at least one of the strategies in each case.
3. Assess student achievement on the basis of class activities relating to Roth's list of concepts.
4. Write test items or design other evaluation techniques to determine the student's level of understanding of the concept(s).
5. Identify or develop teaching materials such as texts, supplementary printed materials, films, filmstrips, and other audiovisual aids that can be used in environmental education.
6. Identify or develop, when appropriate on basis of the school subject taught, laboratory work of an investigative nature.
7. Organize, conduct, and follow up a field trip which emphasizes active student participation.
8. Identify and design effective ways to utilize community resources such as visiting speakers.
9. Conduct discussions on controversial topics in such a way that each student can participate, regardless of his views or level of understanding.
10. Identify and use games and other simulation activities where appropriate.

# WHAT MEANS CAN BE USED TO PREPARE TEACHERS WITH COMPETENCE IN ENVIRONMENTAL EDUCATION?

## Observations About Teacher Education

1. The 42 teacher education institutions in North Carolina vary in many ways: in size, in number of students, in type of institutions, in faculty, in financial resources, and in various other ways. These differences dictate the necessity of multiple approaches instead of one uniform approach; recommendations rather than requirements; guidelines rather than standards.

2. At most institutions, there is little room in the undergraduate teacher education programs for additional required courses. Institutional and accreditation requirements in general education, professional education, and specialization in a teaching field leave little room for additional courses. The press of course requirements is intensified by the movements to allow more electives and to shorten the undergraduate program in order to meet the financial crisis in higher education.

3. Traditionally, the problems of preservice education have been considered separately from those of in-service education. The need to provide in-service work in environmental education for thousands of practicing teachers, while at the same time teacher education institutions must implement programs for preservice teachers, suggests it may be profitable to consider joint programs. The movement toward earlier and an increased variety of professional laboratory experiences also makes a joint in-service and preservice program desirable.

4. There is a large amount and a wide variety of instructional material available for almost every phase of elementary and secondary education. This is not true in teacher education. For example, in science education, little material is available except for a few methods books and the professional journals aimed at practicing science teachers. As a result, individual faculty members must each design most of the materials and activities for the courses they teach.

5. The financial crisis in higher education has encouraged colleges and universities to form consortia to achieve certain goals. On the other hand, there has been little cooperation among teacher education programs at the various institutions in North Carolina. Perhaps the need to prepare teachers literate in environmental matters can be the basis of new cooperative programs.

Recommendations For Teacher Education Institutions

In spite of the many differences among teacher education institutions and the general lack of research findings to support specific recommendations for preparing teachers who will be competent in environmental education, it appears that there are several general courses of action that might be profitably considered:

1. Teacher education institutions should first assess their present programs with the aims of identifying the gaps in the academic and professional preparation of their graduates. The key question is, "What competencies in environmental education must be developed and how can this be done?"

2. The usual way of responding to an unmet need is by creating one or more courses. If this is the avenue taken, the following guidelines should be observed:

   a. The course should avoid needless duplication of what students have already studied in science, social studies, and professional education. It should focus on the development of the competencies they do not already possess and which have been judged to be desirable.

   b. Because of the nature of environmental education, the course by necessity must be interdisciplinary. Lacking an environmental education specialist on the faculty, it probably will be best to team teach the course. It will be desirable for the entire team to participate during all or most of the class meetings and this is especially so the first time the course is taught.

   c. The science part of the course should include laboratory and field work of an investigative nature. This type of laboratory work has been recommended by every major national committee and curriculum project in science education for the last 50 years. The field work in the marine environments carried out by ESEA Title III Project in Carteret County is an excellent example of field work of an investigative nature.

d. Environmental education includes many controversial topics and these should be considered through discussions, debates, role playing, and the use of games and other simulation devices and techniques.

e. The nature of the task of developing competence in environmental education suggests the desirability of individual and/or group project work on local environmental problems. Where possible, directed experiences with appropriate governmental agencies and private environmental groups should also be considered.

3. In some cases, colleges may wish to try alternatives to offering their own regular college courses in environmental education.

   a. The magnitude of the task of providing in-service work in environmental education suggests that it may be desirable to enroll preservice teachers in in-service courses in some areas of North Carolina.

   b. Several colleges in close geographical proximity may wish to undertake a joint effort to provide preservice and in-service environmental education, regardless of whether these two tasks are performed separately or together.

   c. Courses offered during January in colleges on the 4-1-4 plan, or in May by colleges on the early semester plan, may be desirable. As an example, at least two colleges offered special programs in marine environments during May 1972.

4. Institutions of higher education should look for ways outside of class to encourage the development of good environmental habits among their students. The following are examples of extra class activities which should be considered:

   a. Inclusion of students on college committees that deal with environmental problems (traffic, grounds, buildings, etc.).

   b. Seminars, guest speakers, film showings, and other special events dealing with environmental topics.

5. The task of providing for unique professional competencies in environmental education can be handled in several ways.

   a. The route a particular college takes in professional education is somewhat dependent upon what is done to develop academic competencies in environmental education. As was pointed out earlier, students do not learn only subject matter in academic courses and only teaching techniques and related professional ideas in courses in professional education. For example, students taking an investigative field trip can learn about techniques of organizing and conducting a field trip as well as something about the habitats studied.

b. Most colleges will probably choose to incorporate topics on the teaching of environmental education into existing methods courses and professional laboratory experiences. It is strongly recommended that some phase of student teaching include opportunities to deal with environmental matters.

c. The collection of curriculum materials should include a representative sample of textbooks, supplementary books, filmstrips, games, and other material on environmental education.

## EPILOGUE

The task of preparing teachers in environmental education contains some unusual opportunities. When we talk about improving the preparation of elementary school teachers, science teachers, and social studies teachers, we bring to the discussions long-held beliefs, vested interests, and many other inhibitors of progress. This is not the case with environmental education.

In curriculum development, the interdisciplinary nature of environmental education provides a golden opportunity to try new approaches to integrating the disciplines. In teacher education, cooperative programs may be tried among several institutions, joint preservice and in-service programs, new competency assessment procedures, etc. In fact, there are few innovations in teacher education that could not be employed in the preservice and in-service of teachers in environmental education.

We should <u>not</u> look at the education of teachers in environmental education as a laborious task to be accomplished with minimum effort. Instead, we should see it as an opportunity for real experimentation and bold new approaches in teacher education. With the likelihood of more financial resources being allocated to environmental education than perhaps to some other teaching areas, let us use this opportunity and these resources to not only advance environmental education, but to find ways to increase the effectiveness of teacher education programs.

APPENDIX A

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APPENDIX B

*MATERIAL ON ENVIRONMENTAL EDUCATION PREPARED BY THE NORTH CAROLINA STATE DEPARTMENT OF PUBLIC INSTRUCTION*

*Prepared by the Division of Science Education:*

Environmental Education: Concepts, Activities, Bibliography (March 1971)

This publication is composed, as its title suggests, of three major sections. The first section contains Roth's 111 Environmental Concepts. Section two contains 168 environmental education activities broken down into the areas of ecology, natural resources, pollution, and environmental decision-making. An annotated bibliography composes the third section of the publication. (K-12) (48 pages)

"A Time For Man" (April 1971)

This automated slide/tape program is designed for use with teachers and lay people as a preamble to a discussion on environmental issues and/or environmental education. It attempts to point out the state of the environment in the nation and in North Carolina in particular, and to suggest education as a possible solution to the environmental problem. (Teacher's Use and Lay Persons) (12-minutes)

Master Plan For Environmental Education in North Carolina (Draft) (January 1972)

This plan is designed to provide a framework for initiating environmental education programs that will help create, in the most rapid and efficient way possible, an environmentally literate citizenry. (SDPI Use) (28 pages)

Environmental Education: Problems, Projects, and Exercises/Grades 4-10 (February 1972)

This publication is designed primarily to utilize the students' computational skills. The exercises section is intended to motivate teachers and students to further their understanding of environmental issues. The problems section aims at challenging students' problem-solving abilities, and the projects section suggests ways in which efforts may be made to improve environmental conditions. An answer section and bibliography are also included. (4-10) (46 pages)

A Guide To Environmental Education Resources (1972)

This is a listing of some basic and inexpensive materials useful in teaching or learning about environmental problems that face us today. Sections are provided on paperback books, other printed material, bibliographies, multimedia material, periodicals and sources, and motion pictures. (K-12) (9 pages)

Environmental Education Game: "Fox City" (October 1972)

This is a role-playing game for students in and above the middle grades. It involves making decisions that affect resources and conservation in the town of Fox City. The entire class can participate in this game which is designed to illustrate a conflict. (7-12) (6 pages)

Environmental Education: Preservice Preparation of Teachers (1973)

This publication offers practical suggestions as to approaches and methods that may be employed as environmental education is introduced into preservice teacher education. Suggestions contained in this publication should be helpful in establishing guidelines that will bring about effective coordination of programs at all levels. (Higher Education) (22 pages)

Environmental Education Instructional Units: Population, Pollution, Natural Resources (1973)

These three units were prepared for use in classrooms in North Carolina. An interdisciplinary approach encompassing mathematics, science, and social studies is utilized in these units. (7-12)

Population: This unit is a game built around the town of Fox City. The focus is on how an increase in population will affect various aspects of town life and what changes will have to occur to accommodate this increase. It contains pages to be duplicated for student packets, answers to problems, and an appendix.

Pollution: This activity-oriented unit is divided into mini-units on air, litter, noise, and water pollution. Each mini-unit is divided into categories called Looking It Over and Exploring. It contains pages to be duplicated for student activity sheets and an appendix.

Natural Resources: This activity-oriented unit is divided into mini-units on *FORESTS, WILDLIFE, WATER,* and *SOIL AND MINERAL CONSERVATION.* It contains role-playing situations that require the use of imagination by students and an appendix.

*Prepared by the Division of Occupational Education:*

Outdoor Recreation and Applied Ecology (July 1972)

This publication is a curriculum guide to teaching the course of outdoor recreation and applied ecology. The purpose of the course is to provide learning experiences which will enable a person to acquire knowledge, develop understanding and skills necessary to making a meaningful choice in preparing for, entering into, and advancing into an outdoor recreation or an ecology career. (7-12) (194 pages)

Suggestions and Procedures for Developing Teaching-Learning Stations (July 1972)

This publication is designed to accompany the outdoor recreation and applied ecology curriculum guide. It provides descriptions, purposes, requirements (land, equipment, facilities, development time), and references for the development of 23 teaching-learning stations. (7-12) (43 pages)

Suggestions and Procedures in Developing Nature Trails (1972)

The purpose of this booklet is to provide information for teachers, administrators, and students on how they may plan and develop a nature trail at or near their school. It also contains suggested activities for different disciplines and a section on available environmental education resources. (26 pages)

*Prepared by the North Carolina Museums Council:*

Directory (1971)

This publication is a list of: North Carolina historical societies; preservation commissions; research agencies; art, children's, history, and science museums including directors. (Teacher Use) (44 pages)

APPENDIX C

*BIBLIOGRAPHY OF BIBLIOGRAPHIES*

*A great starting point...*

THE ENVIRONMENTAL REFERENCE SERIES

compiled by Musa Qutub, Ph.D.
President, International Association for the Advancement
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E. Q. REFERENCE GUIDE. National Wildlife Federation. A 16-page bibliography of sources and the method of producing the EQ Index. $1.00.

EARL (Environmental Awareness Reading List) and "Readings for the Eco-Activist." Order from: Department of Interior Library, Interior Building, Washington, D. C. 20240.

ENVIRONMENTAL EDUCATION BIBLIOGRAPHY. Thirteen pages free. Order from: Environmental Education Center, 13 Veterans Drive, Oteen, N. C. 28805. Also ask for bibliography on population.

ENVIRONMENTAL EDUCATION: CONCEPTS, ACTIVITIES, BIBLIOGRAPHY. Nine pages of suggested materials for environmental education. Available from the Division of Science Education, N. C. State Department of Education, Raleigh, N. C. 27611.

"Environmental Investigations: Getting Help from Uncle Sam," THE SCIENCE TEACHER. Volume 38, No. 7 (October 1971). pp. 56-62. An extensive listing of free and inexpensive environmental education materials available from government agencies. Reprints from NSTA for $0.50.

"Outdoor Education: A Selected Bibliography Supplement No. 1." Compiled by David M. Altus for ERIC/CRESS, August 1971. 254 pages. $2.00. A bibliography that includes environmental education. It gives the source of the work, a short description, and its availability. Order from: Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.

"Resources and References for Earth Science Teachers." To receive copies of this one-page monthly bibliography, send stamped, self-addressed envelopes (business size) to: Charles A. Wall, RMES, Department of Science Education, The University of Georgia, Athens, Georgia 30601. You will continue to receive monthly copies of the "RREST" bibliographies for as long as your supply of envelopes lasts.

SCIENCE FOR SOCIETY: A BIBLIOGRAPHY, 3rd Edition. 42 pages. This bibliography contains references dealing with the problems and related subproblems of man and his environment. Order from: American Association for the Advancement of Science, Department SF, 1515 Massachusetts Avenue, N. W., Washington, D. C. 20005. $1.00.